THE SMOKE NUISANCE.

We resume the summary of the evidence taken before the select committee. The first witness examined was—

"Dr. D. B. Reid, M.D.—Is professionally a lecturer on chemistry, and has attended a good deal to the ventilation of the House of Commons. The chairman having described the object of the committee, requested the witness to inform the committee, as a chemist, what he considered the nature of smoke? Dr. Reid observed, that it consisted essentially of carbon, separated, by decomposition, from the gaseous matters liberated from the fuel—mixed with minute particles of undecomposed coal, and with moisture and other materials. It might be considered as being produced by imperfect combustion. The cause of the production of smoke is the imperfect oxygenation of inflammable matter. Considers it can be corrected to an extreme extent with benefit to the proprietors, as well as to the public, and by a saving of fuel. There are certain chemical operations where it is important to have a powerful deoxidating influence brought to bear upon the materials, as in some reverberatory-furnaces. This objection, however, has no reference to the greater number of cases where nuisance arises. With respect to the effect of smoke upon air, Dr. Reid observed, he should not attribute greater essential impurity to the air from the development of smoke than from absolute combustion, but the impurity produced by the imperfect combustion which generates smoke, is of a much more offensive nature—in particular, by producing those black portions of soot with which all are familiar, and which, for instance, annoy them at the Houses of Parliament to such an extent, that he had been under the necessity of putting up a veil about forty feet long by twelve deep, on which, in a single evening, they could count 200,000 visible portions, with the naked eye, upon a square inch. On one occasion, at the Horse Guards, the amount of smoke deposited was so great, that the impression of the foot as he walked on it was as distinct as when snow lies on the ground. Considers it injurious to the lungs by inhaling it. It is obvious that, to individuals of a delicate constitution, it must be injurious where such an atmosphere is inspired. Patents have been taken out by many whose labours are advancing the cause. From the experience of twenty-five years, he had found that, when more precise knowledge was gained, the evil was reduced. Ignorance and carelessness on the part of the men, and want of knowledge among proprietors, are, in numerous cases, the causes of the nuisance. Stokers should be better educated; would prefer fining the masters, that they may look after the workmen. Cannot point out any one plan that he would prefer, as he is examining the subject in detail at present. Have declined giving any particular preference, being sometimes doubtful as to the patent right. Had suggested a plan of a common fire-place, which gives off the greatest heat from the least fuel—it will be introduced into the new Houses of Parliament. The fire is placed on a level with the floor, and which is thus warmed by radiation. The Doctor recommended the use of coke, against which, however, there is much prejudice; but all ordinary coal cokes itself, and becomes so in the fire, and is never properly calorific until it is in the state of coke. In by far the greater number of furnaces where smoke is produced, there is no ingress for air whatever. Witness could point out 200 or 300 cases, where there is no legitimate ingress for air. Much is to be ascertained respecting the peculiar forms of boilers; he would leave it to the assistance of general education, with legislative enactments, and the interests of patentees. The nuisance of smoke may be abolished without injury to any one.

"William West, Esq., was next examined.—Is lecturer on chemistry at Leeds; has paid much attention to the nuisance of smoke. The visible portion of black smoke is extremely injurious to health. Mechanical impurities in the air are more hurtful than chemical impurities. Many of the most revolting employments where the air is chemically impure, are not known to shorten life. The inhaling any material substance is injurious to longevity. Smoke arises from imperfect combustion by an insufficient quantity of oxygen, or its being introduced too early or too late. A sufficient quantity of air should be introduced at the right periods of the process, and in the right parts of the furnace. Speaking generally, prefers those plans which diffuse or mix the air, instead of introducing it in one volume—so far as that can be practically effected. Likes those plans which admit the greatest quantity of air immediately after feeding, and which shut it off gradually, so that, when the coal is well charred, no more is admitted than what passes through the bars. There is a decided difference in the abatement of the nuisance at Leeds. The municipal authorities sent notice to all mill-owners, and have given much offence in doing so. The very knowledge that the Leeds Improvement Bill had passed, produced some effect. If the Act were strictly enforced, it would, in a great measure, abate the nuisance. Agrees with Dr. Reid that particular circumstances require different plans. Has inspected about ten different modes in operation at Leeds.—Q. Will you detail to the committee the plans you most approve? A. I think that Charles Williams's, of Liverpool, is the best in theory; but I think there are great objections to that theory being brought into full effect. It is the theory of diffusion through small holes. I think it would be desirable to add to that plan some mode of shutting off the air completely, or shutting it off gradually, instead of suddenly, which, I believe, he now does. Then I should say the three or four that I should next recommend are, Pritchard's, of Leeds; Thomas Hall's, of Leeds; Rodda's, and Billingsley's, of Bradford. Billingsley's is a good one; Pritchard's is on the principle of admitting air when the fire is fed, and gradually shutting it off; Billingsley's is highly spoken of—there are two sets of bars over the door, which, as they are moved to the right or left, leave half the spaces open or shut. Had seen Samuel Hall's patent; should not put it in the first rank. There is no mode of testing these plans equal to the eye; the black smoke, or soot, can be judged by the eye. If, instead of complete combustion, a large portion of carbonic oxide were sent up the chimney, that carbonic oxide would be invisible. Smoke, for legal purposes, may be defined to be soot, sent up the chimney; scientifically, it is finely divided carbon, arising from imperfect combustion. Believes the carbonic oxide notion is a favourite hobby with many persons, but that there is very little in it. There are some persons who can only be induced to act by legislative enactments. Would, therefore, recommend legislation on the subject.

"Mr. John Smith (the next witness).—Is a commissioner at Bradford, under the Act for improving the town. Examined many patented plans. The commissioners were under peculiar circumstances. The owners of fire-places were, by the Act of 1802, required to construct them so as most effectually to destroy the smoke, provided they did not infringe on any patent. Mr. Billingsley invented a plan, but had no patent for it; offered to put up the plan for others; the consequence was, a good many were put up under Mr. Billingsley's own superintendence. Believes Bradford is most forward in eradicating the nuisance. Mr. Billingsley's plan combines every chemical requisite for complete combustion. At the periods of feeding the furnace, so much gas is given off, as to require an additional supply of air more than can get through the fire itself; by means of a sliding rack in front of the furnaces, this can be shut and opened, and regulated at discretion; if additional air be admitted beyond the bridge, it has to mix not only with the gaseous productions of the coal, but with the incombustible gases. Mr. Williams's plan is, that he conducts the air to the back of the furnace. The principle of consuming the gas is precisely the same as Mr. Billingsley's, but the mode of accomplishing it is different. A better definition of combustion cannot be given than Mr. Williams lays down in his treatise; the only fault is, the mechanical means of accomplishing the chemical process. The great distinction between Mr. Billingsley's plan and that of Mr. Williams is, simply, that Mr. Billingsley admits the air in front—Mr. Williams admits it after the gases have got beyond the fire, and in all sorts of ways, vertical and horizontal. Mr. Billingsley admits the air either by a rack, as shewn by the model, or by a door—the form of admission is perfectly immaterial; it is the air that is wanted, no matter in what form. By Mr. Billingsley's plan, it enters in one broad connected sheet, not in a divided form. It is one sheet of air going over the entire surface of the furnace.—Q. What advantage is there in admitting air in a sheet in front, instead of by a single aperture?—A. There is no difference; because, when it goes through many apertures, it is still reduced into one body.—Q. Then why do you adopt the plan of having a number of apertures instead of one? A. Merely for the nicety of the arrangement, that is all.—Q. And not from any utility? A. Not from any utility. Has made no experiments as to the advantages of Mr. Billingsley's or Mr. Williams's plans. Has never seen any experiments made which would shew the economy or capability of one furnace over the other. Has not made any experiment on Mr. Billingsley's plan.

"Mr. Edward Billingsley examined.—Has succeeded in completing a plan (spoken to by last witness) which prevents the smoke nuisance. Has applied the plan to upwards of 200 furnaces in the last six months. In a plan for abating the nuisance, the gases must be heated, by radiation, to the degree of ascension which is requisite to their combining with an equivalent supply of air. The saving of fuel is proportional to the attention of the stoker and the nature of the coal; the attention of the stoker is required to its ever varying stages. If the coal is very bituminous, the most smoke will be made if improperly consumed. The master of a concern should be legally liable to a penalty for the smoke nuisance—the same to be stopped from the fireman's wages. Accounts for the saving, by the perfect combustion of the gases. The saving is 20 per cent. Speaks as a master manufacturer. His plan requires a great deal of attention on the part of stokers; it is a chemical manifestation; if it were a mechanical operation, it might go by itself. If the whole of the smoke escapes, the steam gauge invariably sinks; if thrown into combustion, it rises again. Could not produce the same quantity of work if he did not consume the smoke. Before commencing to burn the smoke, was obliged to work two boilers; now, works but one.

"C. Wye Williams, Esq., was the next witness examined.—Is managing director of the Dublin Steam Company. Founder of the first steam establishment, about twenty years ago. The principles of destroying smoke, as laid down by the first chemical authorities, is, that there must be a mechanical mixing or diffusion of the gas and the air, previous to combustion, so that the atoms of the one must come into contact with the atoms of the other, which are to combine in combustion. In the Argand burner, the gas is divided into films or jets in its passage to the air; if the air be divided in its passage to the gas, the effect is the same—chemically, there is no difference. The principle of his patent, then, is to introduce the air to the combustible gases in a divided form. The object is to effect a rapid mechanical mixture before the gases have passed into the flues and are cooled. In what the last witness said he is mistaken, that the air admitted in small divisions unites again into a body; like water issuing from the rose of a watering-pot, each drop of water comes in contact with a larger surface of the air, and as contact only takes place on the surface, the mixture is effected. In the furnace there is not time for mixing, because the gases, as fast as generated, are carried rapidly into the flues; the object, therefore, is, to effect mechanically, by dividing the air, what otherwise there is not time to do. There may be more convenience in admitting the air in one place or another; always admits a large portion of air in front by numerous jets. Some kinds of coal make a difference. In an Argand burner sixteen holes are used, instead of one large one. The last witness said it was a matter of indifference whether he used a number of holes or a single long orifice—why, then, does he adopt a number, if one will do? His using so many holes shews they are necessary. We use jets, because jets give an increased surface. The more surface is given, the quicker is the mixture in a state for chemical combustion. If brought together in a body, they become cooled down. The solar lamp is a further illustration; the flame, instead of being in a number of jets, is in a continuous line, and the